

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
RESEARCH AND TECHNOLOGY RESUME

## TITLE

INFRARED OBSERVATIONS OF OUTER PLANET SATELLITES

## PERFORMING ORGANIZATION

JET PROPULSION LABORATORY  
4800 OAK GROVE DRIVE  
PASADENA, CA 91109

## INVESTIGATOR'S NAME

JOHNSON, T. V.

## TEL. NO.

(818) 354-2761

DESCRIPTION (a. Brief statement on strategy of investigation; b. Progress and accomplishments of prior year; c. What will be accomplished this year, as well as how and why; and d. Summary bibliography)

A. OBJECTIVE: This task supports IR observations of the outer planet satellites. These data provide vital information about the thermophysical properties of satellite surfaces, including internal heat sources for Io. Observations include both broad and narrow band measurements in the 2 to 20 $\mu$ m spectral range. Most observations are carried out at the IRTF facility on Mauna Kea. Types of observation and target priority are determined to make maximum use of existing data from Voyager and other missions, support on-going and planned missions such as Galileo, and to develop techniques and data for planning new missions and instrumentation.

B. PROGRESS: The program in the last year has aimed at obtaining longitude coverage on Io to establish stability of hot spot patterns previously reported. Several runs produced the most complete data set for an apparition since we started the program in 1983; unfortunately bad weather limited coverage of key longitude ranges containing the largest known hot spot Loki. Among the preliminary results is the observation of an outburst in Io's thermal flux that was measured at 4.8, 8.7 and 20 $\mu$ m. Analysis of those data has given the best evidence to date of silicate volcanism on Io; this is one of the most significant pieces of the puzzle as to the relative roles of silicate and sulfur volcanism on Io. We are collaborating with J. Goguen (NRC RRA) to finish reduction of mutual event data, which have already improved ephemeris information for the satellites. The data appear to place significant limits on the characteristics of any leading side hot spots. Our earlier data were used in two published analysis papers concerning correlations of hot and dark regions and models for the occultation data at several wavelengths.

C. PROPOSED WORK: During 1988, we plan a series of 3 to 4 observing sessions. Emphasis will be on further study of high temperature eruptive events on Io, on studying the suspected variability of the high temperature component(s) suggested by last year's data and on obtaining longitude coverage constraining the hot spots in the Loki region.

D. SUMMARY BIBLIOGRAPHY: Johnson, T. V. et al, Io: Evidence for silicate volcanism in 1986; Goguen, J. D. et al, Io hot spots: IR photometry of satellite occultations; Goguen, J. D. et al., Io hot spots: Satellite occultations of sources.

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